



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,778	12/20/2005	Hidenobu Wakita	601560-20US (04P604US/P36)	4349
53092 7590 08/30/2010 Panitch Schwarze Belisario & Nadel LLP PANASONIC ONE COMMERCE SQUARE 2005 MARKET STREET SUITE 2200 PHILADELPHIA, PA 19103				
EXAMINER WANG, EUGENIA				
ART UNIT 1795		PAPER NUMBER		
NOTIFICATION DATE 08/30/2010		DELIVERY MODE ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

usptomail@panitchlaw.com

Office Action Summary

Application No.

10/561,778

Applicant(s)

WAKITA ET AL.

Examiner

EUGENIA WANG

Art Unit

1795

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 18-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 18-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI/22)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Response to Amendment

1. In response to the amendment received July 26, 2010:
 - a. Claims 1 and 18-20 are pending.
 - b. The previous 112 rejections have been withdrawn in light of the amendment.
 - c. The rejection wherein US 2004/0247985 (Takebe et al.) is relied upon as a prior art reference has been withdrawn as a prior art reference. The filing of the certified translation of the foreign priority document (JP 2003-405016) provides support for the claimed invention, and thus perfects priority to December 3, 2003.
 - d. The core of the other previous prior art rejection have been maintained. However changes have been made in light of the amendment (due to the new limitations). All changes made are made in light of the amendment. Thus, the action is final.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1 and 18-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 10 recite "an air supply portion connected to a position upstream of said reformer in a flow of the fuel" (lines 12-13). However, as seen in fig. 1 of the disclosure, although the air delivered is upstream the reformer (via line [6]), it is not in the flow of the fuel (as the fuel appears to be delivered via another line). Accordingly, this limitation is seen as new matter. Since claims 18-19 are dependent on claim 1, they are rejected for the same reason.

3. Claims 1 and 18-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 20 cite that the air supply portion may be configured to supply air to at least one of..." (lines 13-14). However the phrase "may be configured" is ambiguous as it does not necessarily require any such configuration. Accordingly, it is unclear as to the structure of the fuel cell. Thus such claim language is seen to be indefinite. Since claims 18-19 are dependent on claim 1, they are rejected for the same reason.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,551,732 (Xu) in view of US 2002/0076582 (Reiser et al.), US 2002/0150805 (Stenersen et al.), and US 2003/0143129 (Rabellino et al.) as evidenced by US 2004/0247985 (Takebe et al.).

As to claim 1, Xu teaches a fuel cell power system [10] with a reformer [6] configured to generate a hydrogen-rich gas containing carbon monoxide from a fuel containing a hydrocarbon and water (fig. 1; col. 2, lines 42-57), a shift converter (water-gas shift reactor [7]) configured to generate hydrogen and carbon dioxide from carbon monoxide and water (fig. 1; col. 5, lines 64), a carbon monoxide removing portion (oxidation reactor [8]) configured to reduce carbon monoxide that has not been removed from the shift converter (water-gas shift reactor [7]) (fig. 1; col. 5, line 60 to col. 6, line 3). It is noted that after processing, the fuel is sent to the anode and the air (oxidizing gas) is sent to the cathode, wherein these two reactants are used in a fuel cell to produce electric energy (power) (col. 1, lines 18-24; col. 5, lines 54-63). As seen in fig. 1, there is an air supply portion (compressor [1] fed with air [100]). This is considered upstream to reformer [6], as it feeds into it, wherein it is mixed with the fuel of the reformer [6] (thus considered to be in the flow of the fuel) (fig. 1; col. 6, lines 45-58).

Xu does not teach (a) connecting the air supply at a position between the carbon monoxide removing portion and the fuel cell in the flow of the fuel, or the claimed impurity removing means for the air supply portion, specifically that there is (b) a sulfur oxide absorbing portion with at least one of an absorbing agent and absorbing agent of the sulfur oxide and (c) a catalytic combustor disposed upstream of the sulfur oxide

absorbing portion and configured to oxidize hydrogen sulfide into sulfur oxide, wherein (d) the impurity removing means removes the impurity from one of the positions of upstream the reformer and between the carbon monoxide removing portion of the fuel cell.

With respect to (a), Reiser et al. teach connecting the cathode air directly to the fuel line between the fuel cell and the hydrogen source (fig. 1). (It is noted that the hydrogen source of Reiser et al., as applied to the teaching of Xu et al. is seen to be anything prior to providing hydrogen that is ready to be used in a fuel cell – i.e. the hydrogen generation portion. Such an interpretation can be taken as the hydrogen of Reiser et al. delivered (from source [140]) is used directly in the fuel cell.) The motivation for wanting to connect the air source directly to the hydrogen line (prior to the fuel cell but after the hydrogen has been prepared for fuel cell usage) is in order to purge the anode side of the fuel cell upon shut down (para 0030). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to connect the air source directly to the hydrogen line (prior to the fuel cell but after the hydrogen has been prepared for fuel cell usage) is in order to provide a purging system to safely shut down the fuel cell.

With respect to (b), Stenersen et al. recognizes that pollutants such as oxides of nitrogen, oxides of sulfur, and hydrogen sulfide are within atmospheric air, and that removal to such contaminants (prior to being introduced to the fuel cell) would allow fuel cells to be used in a wide range of environments (para 0009; fig. 1). Specifically, it is taught that a filtering system should have chemical removal portion to adsorb such

materials (thus constituting a sulfur oxide absorbing portion) (para 0090; para 0095-96). The motivation for having a filtering system to remove pollutants such as sulfur oxides from air (prior to being fed to the fuel cell) is to ensure the usability of such fuel cell in a wide range of environments (para 0009; see fig. 1). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to include a sulfur oxide absorbing portion (as taught by Stenersen et al.) would be to ensure the usability of fuel cells in a wide range of environments.

With respect to (c), Rabellino et al. teach of purifying to remove sulfur containing compounds and NO_x (nitrogen oxide) (para 0009). The process used is an oxygen catalyst unit [200] (combustor) that oxidizes contaminants in air and then allows them to be removed via adsorption (para 0032). (This is indication of combustion as CO₂ is stated to be formed from higher hydrocarbons; see para 0032.) It is noted that the oxidation catalyst is operated at a temperature of 300 °C (para 0042). In such a manner, it is noted that hydrogen sulfur (which is present in air, as set forth above) would inherently be oxidized to sulfur oxide.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

In the case of the instant application the basis for expectation of inherency is that Rabellino et al.'s system has an oxidation catalyst present for oxidizing, wherein the temperature air is held at, 300°C, when in contact with such a oxygen catalyst unit is sufficient for causing hydrogen sulfide to oxidize to sulfur oxide. At this point Takabe et al. is relied upon to show that hydrogen sulfide indeed oxidizes at such a temperature, As Takabe et al. shows that sulfur oxides form in the presence of a catalyst at temperatures as low as 200°C (para 0033-0034).

The Examiner invites applicant to provide that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product.

Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

Accordingly in such a manner, the combination of Rabellino et al. with Xu, Reiser et al. and Sternsen et al. would result in the claimed invention (as the combination has a sulfur oxide absorbing portion with a catalytic combustor disposed upstream, since

Rabellino et al.'s system oxidizes prior to adsorbing, as set forth above). The motivation for wanting to apply the system of Rabellino et al. (i.e. oxidizing contaminants in air prior to adsorbing them) is that the use of such a system provides air filtration wherein adsorption requires less maintenance (para 0012). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to have applied the system of Rabellino et al. to the combined teachings of Xu and Sternsen et al. in order to provide a system that requires less maintenance. Furthermore, at the very least the application of such a system (oxidizing and then adsorbing) would have provided the predictable of helping to purify air. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use such a system, as the application of it would have yielded the predictable result of providing purified air to the necessary system. (Note: Rabellino et al. is combinable with Sternsen et al., as applied to Xu, as both are focused with air pollution removal.)

With respect (d), it is noted that the combination made above would render such a limitation obvious, as Stenersen et al. specifically renders obvious as to why the pollutants must be removed prior to entry of the fuel cell (and thus provides motivation for removing such pollutants both prior to reformer deliver as well as before deliver to the fuel cell via the anode). (See section (b) above for further details.)

As to claim 18, the combination renders the claim limitation obvious, as the combination would yield the combustor (oxygen catalyst unit [200]) of Rabellino et al. would be placed upstream of the hydrogen generator of Xu, as Stenersen et al. teach

of removing pollutants prior to feeding to the fuel cell (fig. 1 of Stenersen et al.) and Xu shows that the exhaust from the fuel cell feeds to the hydrogen generator (fig. 1 of Xu). Accordingly, the combustor is positioned to exchange heat with an exhaust gas resulting from combustion (as any residual heat would go through the system and eventually be indirectly fed to the hydrogen generator), barring specification as to what constitutes "positioned to exchange heat." Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22, 13 USPQ2d, 1320, 1322 (Fed. Cir. 1989).

As to claim 19, the combination renders the claim limitation obvious, as the combination would yield the combustor (oxygen catalyst unit [200] of Rabellino et al.) and sulfur oxide absorbing portion (filter assembly [10] of Stenersen et al.) would be placed upstream of the hydrogen generator of Xu, as Stenersen et al. teaches of removing pollutants prior to feeding to the fuel cell (fig. 1 of Stenersen et al.) and Xu shows that the exhaust from the fuel cell feeds to the hydrogen generator (fig. 1 of Xu). Accordingly, the sulfur oxide absorbing portion is positioned to exchange heat with an exhaust gas resulting from combustion (as it is downstream the combustor, wherein any residual heat would go through the system and eventually be indirectly fed to the hydrogen generator), barring specification as to what constitutes "positioned to exchange heat." Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55,

44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22, 13 USPQ2d, 1320, 1322 (Fed. Cir. 1989).

As to claim 20, Xu teaches a fuel cell power system [10] with a reformer [6] configured to generate a hydrogen-rich gas containing carbon monoxide from a fuel containing a hydrocarbon and water (fig. 1; col. 2, lines 42-57), a shift converter (water-gas shift reactor [7]) configured to generate hydrogen and carbon dioxide from carbon monoxide and water (fig. 1; col. 5, lines 64), a carbon monoxide removing portion (oxidation reactor [8]) configured to reduce carbon monoxide that has not been removed from the shift converter (water-gas shift reactor [7]) (fig. 1; col. 5, line 60 to col. 6, line 3). It is noted that after processing, the fuel is sent to the anode and the air (oxidizing gas) is sent to the cathode, wherein these two reactants are used in a fuel cell to produce electric energy (power) (col. 1, lines 18-24; col. 5, lines 54-63). As seen in fig. 1, there is an air supply portion (compressor [1] fed with air [100]). This is considered upstream to reformer [6], as it feeds into it, wherein it is mixed with the fuel of the reformer [6] (thus considered to be in the flow of the fuel) (fig. 1; col. 6, lines 45-58).

Xu does not teach (a) connecting the air supply at a position between the carbon monoxide removing portion and the fuel cell in the flow of the fuel, or the claimed impurity removing means for the air supply portion, specifically that there is (b) a sulfur oxide absorbing portion with at least one of an absorbing agent and absorbing agent of the sulfur oxide and (c) a catalytic combustor configured to oxidize hydrogen sulfide into sulfur oxide, wherein (d) the catalytic combustor functions as the sulfur absorbing

portion as the sulfur oxide absorbing portion having a catalyst containing noble metal and alkaline earth metal, wherein the catalytic combustor is positioned to exchange heat with the hydrogen generator or with an exhaust resulting from combustion which is used to heat the hydrogen generator, wherein (e) the impurity removing means removes the impurity from one of the positions of upstream the reformer and between the carbon monoxide removing portion of the fuel cell.

With respect to (a), Reiser et al. teach connecting the cathode air directly to the fuel line between the fuel cell and the hydrogen source (fig. 1). (It is noted that the hydrogen source of Reiser et al., as applied to the teaching of Xu et al. is seen to be anything prior to providing hydrogen that is ready to be used in a fuel cell – i.e. the hydrogen generation portion. Such an interpretation can be taken as the hydrogen of Reiser et al. delivered (from source [140]) is used directly in the fuel cell.) The motivation for wanting to connect the air source directly to the hydrogen line (prior to the fuel cell but after the hydrogen has been prepared for fuel cell usage) is in order to purge the anode side of the fuel cell upon shut down (para 0030). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to connect the air source directly to the hydrogen line (prior to the fuel cell but after the hydrogen has been prepared for fuel cell usage) is in order to provide a purging system to safely shut down the fuel cell.

With respect to (b), Stenersen et al. recognizes that pollutants such as oxides of nitrogen, oxides of sulfur, and hydrogen sulfide are within atmospheric air, and that removal to such contaminants (prior to being introduced to the fuel cell) would allow fuel

cells to be used in a wide range of environments (para 0009; fig. 1). Specifically, it is taught that a filtering system should have chemical removal portion to adsorb such materials (thus constituting a sulfur oxide absorbing portion) (para 0090; para 0095-96). The motivation for having a filtering system to remove pollutants such as sulfur oxides from air (prior to being fed to the fuel cell) is to ensure the usability of such fuel cell in a wide range of environments (para 0009; see fig. 1). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to include a sulfur oxide absorbing portion (as taught by Stenersen et al.) would be to ensure the usability of fuel cells in a wide range of environments.

With respect to (c), Rabellino et al. teach of purifying to remove sulfur containing compounds and NO_x (nitrogen oxide) (para 0009). The process used is an oxygen catalyst unit [200] (combustor) that oxidizes contaminants in air and then allows them to be removed via adsorption (para 0032). (This is indication of combustion as CO₂ is stated to be formed from higher hydrocarbons; see para 0032.) It is noted that the oxidation catalyst is operated at a temperature of 300 °C (para 0042). In such a manner, it is noted that hydrogen sulfur (which is present in air, as set forth above) would inherently be oxidized to sulfur oxide.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

In the case of the instant application the basis for expectation of inherency is that Rabellino et al.'s system has an oxidation catalyst present for oxidizing, wherein the temperature air is held at, 300°C, when in contact with such a oxygen catalyst unit is sufficient for causing hydrogen sulfide to oxidize to sulfur oxide. At this point Takabe et al. is relied upon to show that hydrogen sulfide indeed oxidizes at such a temperature, As Takabe et al. shows that sulfur oxides form in the presence of a catalyst at temperatures as low as 200°C (para 0033-0034).

The Examiner invites applicant to provide that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product.

Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

Accordingly in such a manner, the combination of Rabellino et al. with Xu, Reiser et al. and Sternsen et al. would result in the claimed invention (as the combination has a sulfur oxide absorbing portion with a catalytic combustor disposed upstream, since Rabellino et al.'s system oxidizes prior to adsorbing, as set forth above). The motivation for wanting to apply the system of Rabellino et al. (i.e. oxidizing contaminants in air prior to adsorbing them) is that the use of such a system provides air filtration wherein adsorption requires less maintenance (para 0012). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to have applied the system of Rabellino et al. to the combined teachings of Xu and Sternsen et al. in order to provide a system that requires less maintenance. Furthermore, at the very least the application of such a system (oxidizing and then adsorbing) would have provided the predicable of helping to purify air. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use such a system, as the application of it would have yielded the predictable result of providing purified air to the necessary system. (Note: Rabellino et al. is combinable with Sternsen et al., as applied to Xu, as both are focused with air pollution removal.)

As to (d), the combination set forth above renders the claim limitation obvious, as the combination would yield the a composite catalytic combustor (made of combustor, oxygen catalyst unit [200], as rendered obvious by Rabellino et al. and sulfur oxide absorbing portion, filter assembly [10], as rendered obvious by Stenersen et al.) would be placed upstream of the hydrogen generator of Xu, since Stenersen et al. teach of

removing pollutants prior to feeding to the fuel cell (fig. 1 of Stenersen et al.) and Xu shows that the exhaust from the fuel cell feeds to the hydrogen generator (fig. 1 of Xu). Accordingly, the composite catalytic combustor (as defined above) positioned to exchange heat with an exhaust gas resulting from combustion (as it is downstream the combustor, wherein any residual heat would go through the system and eventually be indirectly fed to the hydrogen generator), barring specification as to what constitutes "positioned to exchange heat." Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22, 13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). Furthermore, it is noted that such the composite catalytic combustor of has two catalyst materials. The combustor (oxygen catalyst unit [200]) of Rabellino et al. has a catalyst, such as platinum or palladium (noble metals) (para 0042-0043). The sulfur oxide absorbing portion (filter assembly [10]) of Stenersen et al. embodies the use of materials such as calcium carbonate and calcium sulfate (calcium is an alkaline metal) (para 0091).

Note: An alternate rejection is set forth below, wherein a narrower claim interpretation is given to the catalytic combustor (not using the "composite" combustor interpretation). See *, below.

With respect (e), it is noted that the combination made above would render such a limitation obvious, as Stenersen et al. specifically renders obvious as to why the pollutants must be removed prior to entry of the fuel cell (and thus provides motivation

for removing such pollutants both prior to reformer deliver as well as before deliver to the fuel cell via the anode). (See section (b) above for further details.)

5. *Alternately, claim20 rejected under 35 U.S.C. 103(a) as being unpatentable over Xu in view of Reiser et al., Stenersen et al., Rabellino et al., and US 6129833 (McCauley), as evidenced by Takebe et al.

As to claim 20, Xu teaches a fuel cell power system [10] with a reformer [6] configured to generate a hydrogen-rich gas containing carbon monoxide from a fuel containing a hydrocarbon and water (fig. 1; col. 2, lines 42-57), a shift converter (water-gas shift reactor [7]) configured to generate hydrogen and carbon dioxide from carbon monoxide and water (fig. 1; col. 5, lines 64), a carbon monoxide removing portion (oxidation reactor [8]) configured to reduce carbon monoxide that has not been removed from the shift converter (water-gas shift reactor [7]) (fig. 1; col. 5, line 60 to col. 6, line 3). It is noted that after processing, the fuel is sent to the anode and the air (oxidizing gas) is sent to the cathode, wherein these two reactants are used in a fuel cell to produce electric energy (power) (col. 1, lines 18-24; col. 5, lines 54-63). As seen in fig. 1, there is an air supply portion (compressor [1] fed with air [100]). This is considered upstream to reformer [6], as it feeds into it, wherein it is mixed with the fuel of the reformer [6] (thus considered to be in the flow of the fuel) (fig. 1; col. 6, lines 45-58).

Xu does not teach (a) connecting the air supply at a position between the carbon monoxide removing portion and the fuel cell in the flow of the fuel, or the claimed impurity removing means for the air supply portion, specifically that there is (b) a sulfur oxide absorbing portion with at least one of an absorbing agent and absorbing agent of

the sulfur oxide and (c) a catalytic combustor configured to oxidize hydrogen sulfide into sulfur oxide, wherein (d) the catalytic combustor functions as the sulfur absorbing portion as the sulfur oxide absorbing portion having a catalyst containing noble metal and alkaline earth metal, wherein the catalytic combustor is positioned to exchange heat with the hydrogen generator or with an exhaust resulting from combustion which is used to heat the hydrogen generator, wherein (e) the impurity removing means removes the impurity from one of the positions of upstream the reformer and between the carbon monoxide removing portion of the fuel cell.

With respect to (a), Reiser et al. teach connecting the cathode air directly to the fuel line between the fuel cell and the hydrogen source (fig. 1). (It is noted that the hydrogen source of Reiser et al., as applied to the teaching of Xu et al. is seen to be anything prior to providing hydrogen that is ready to be used in a fuel cell – i.e. the hydrogen generation portion. Such an interpretation can be taken as the hydrogen of Reiser et al. delivered (from source [140]) is used directly in the fuel cell.) The motivation for wanting to connect the air source directly to the hydrogen line (prior to the fuel cell but after the hydrogen has been prepared for fuel cell usage) is in order to purge the anode side of the fuel cell upon shut down (para 0030). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to connect the air source directly to the hydrogen line (prior to the fuel cell but after the hydrogen has been prepared for fuel cell usage) is in order to provide a purging system to safely shut down the fuel cell.

With respect to (b), Stenersen et al. recognizes that pollutants such as oxides of nitrogen, oxides of sulfur, and hydrogen sulfide are within atmospheric air, and that removal to such contaminants (prior to being introduced to the fuel cell) would allow fuel cells to be used in a wide range of environments (para 0009; fig. 1). Specifically, it is taught that a filtering system should have chemical removal portion to adsorb such materials (thus constituting a sulfur oxide absorbing portion) (para 0090; para 0095-96). The motivation for having a filtering system to remove pollutants such as sulfur oxides from air (prior to being fed to the fuel cell) is to ensure the usability of such fuel cell in a wide range of environments (para 0009; see fig. 1). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to include a sulfur oxide absorbing portion (as taught by Stenersen et al.) would be to ensure the usability of fuel cells in a wide range of environments.

With respect to (c), Rabellino et al. teach of purifying to remove sulfur containing compounds and NO_x (nitrogen oxide) (para 0009). The process used is an oxygen catalyst unit [200] (combustor) that oxidizes contaminants in air and then allows them to be removed via adsorption (para 0032). (This is indication of combustion as CO₂ is stated to be formed from higher hydrocarbons; see para 0032.) It is noted that the oxidation catalyst is operated at a temperature of 300 °C (para 0042). In such a manner, it is noted that hydrogen sulfur (which is present in air, as set forth above) would inherently be oxidized to sulfur oxide.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but

the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

In the case of the instant application the basis for expectation of inherency is that Rabellino et al.'s system has an oxidation catalyst present for oxidizing, wherein the temperature air is held at, 300°C, when in contact with such a oxygen catalyst unit is sufficient for causing hydrogen sulfide to oxidize to sulfur oxide. At this point Takabe et al. is relied upon to show that hydrogen sulfide indeed oxidizes at such a temperature, As Takabe et al. shows that sulfur oxides form in the presence of a catalyst at temperatures as low as 200°C (para 0033-0034).

The Examiner invites applicant to provide that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product.

Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596

(CCPA 1980) (quoting *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

Accordingly in such a manner, the combination of Rabellino et al. with Xu, Reiser et al. and Sternsen et al. would result in the claimed invention (as the combination has a sulfur oxide absorbing portion with a catalytic combustor disposed upstream, since Rabellino et al.'s system oxidizes prior to adsorbing, as set forth above). The motivation for wanting to apply the system of Rabellino et al. (i.e. oxidizing contaminants in air prior to adsorbing them) is that the use of such a system provides air filtration wherein adsorption requires less maintenance (para 0012). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to have applied the system of Rabellino et al. to the combined teachings of Xu and Sternsen et al. in order to provide a system that requires less maintenance. Furthermore, at the very least the application of such a system (oxidizing and then adsorbing) would have provided the predicable of helping to purify air. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use such a system, as the application of it would have yielded the predictable result of providing purified air to the necessary system. (Note: Rabellino et al. is combinable with Sternsen et al., as applied to Xu, as both are focused with air pollution removal.)

As to (d), first it is noted that the combination renders obvious a combustor, oxygen catalyst unit [200], as rendered obvious by Rabellino et al. and sulfur oxide absorbing portion, filter assembly [10], as rendered obvious by Stenersen et al.)

upstream of the hydrogen generator of Xu, since Stenersen et al. teach of removing pollutants prior to feeding to the fuel cell (fig. 1 of Stenersen et al.) and Xu shows that the exhaust from the fuel cell feeds to the hydrogen generator (fig. 1 of Xu). Furthermore, it is noted that such the combination uses two catalyst materials. The combustor (oxygen catalyst unit [200]) of Rabellino et al. has a catalyst, such as platinum or palladium (noble metals) (para 0042-0043). The sulfur oxide absorbing portion (filter assembly [10]) of Stenersen et al. embodies the use of materials such as calcium carbonate and calcium sulfate (calcium is an alkaline metal) (para 0091).

As set forth above, there is no teaching that the combustor and sulfur oxide removal portion are integral. However, McCauley teaches that it is known to have a combustor in combination with a sulfur oxide absorbing portion (para bridging col. 6 and 7). It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the combustor and absorbing portion integral, since it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893). Furthermore, at the very least McCauley teaches that the integration of a combustor and sulfur oxide removal portion would yield the predictable result of acting as both a combustor as well as a sulfur oxide removal portion. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to combine the combustor and absorbing portion (as rendered obvious separately by Stenersen and Rabellino), as such integration would

have yielded the predictable result of operating in the same manner (as shown by McCauley).

With respect (e), it is noted that the combination made above would render such a limitation obvious, as Stenersen et al. specifically renders obvious as to why the pollutants must be removed prior to entry of the fuel cell (and thus provides motivation for removing such pollutants both prior to reformer deliver as well as before deliver to the fuel cell via the anode). (See section (b) above for further details.)

Response to Arguments

6. Applicant's arguments filed July 26, 2010 have been fully considered but they are not persuasive.

First it is noted that the reliance on Takebe et al. as a prior art reference has been withdrawn in light of the submission of the Japanese Priority document. Accordingly, any arguments with respect to this rejection are moot. However, Examiner would like to note that Takebe is still relied upon as an evidentiary reference, wherein the reliance on a reference in this capacity is still proper. "In certain circumstances, references cited to show a universal fact need not be available as prior art before applicant's filing date. *In re Wilson*, 311 F.2d 266, 135 USPQ 442 (CCPA 1962). Such facts include the characteristics and properties of a material or a scientific truism." See MPEP §2124.

Applicant argues that Xu et al. does not teach of an air supply portion connect to both "a position upstream of said reformer in a flow of the fuel and connected to a

position between said carbon monoxide removing portion and said fuel cell in the flow of the fuel" as in amended claim 1.

Examiner respectfully disagrees with Applicant's position. It is submitted that Xu is not used alone but is used in combination, wherein Reiser et al. has been relied upon herein to render obvious such a new limitation. Thus such arguments are not convincing, and the rejection of record is maintained.

With respect to claim 1, Applicant argues Stenersen et al. only teach of oxygen entering the fuel cell at the cathode and thus does not suggest an air supply in other places have their contaminants removed.

Examiner respectfully disagrees. It is submitted that Applicant is not considering the combination of references. Stenersen et al. is combined with Xu, wherein Xu's remaining air in the cathode exhaust is fed to the reformer (upstream of the reformer). As combined with Stenersen et al. (which teaches of removing contaminants prior to being fed to the cathode), the cathode air in, and thus the exhaust resulting from it (fed to the reformer, and thus upstream) has also been filtered as well. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Even if this were not the case, it is submitted that the general teaching of Stenersen et al. is remove contaminants from a fuel cell reactant so that they are not fed to a fuel cell (even if the teaching is directed at the cathode). Thus with the general teaching, one of ordinary

skill would recognize that the inclusion of contaminants would harm fuel cell operation and would have found it obvious to remove such contaminants, contrary to what Applicant is submitting (which is that one of ordinary skill in the art with a teaching about the detriments of contaminants in air as supplied to a fuel cell would not find it obvious to remove such contaminants). Thus such arguments are not convincing, and the rejection of record is maintained.

With respect to the arguments regarding the 103 rejections, Applicant argues that the prior art used to obviate the rejected claims (Stenersen et al. and Rabellino et al.) do not cure the deficiencies of the primary reference (Xu) (with respect to the connection upstream the reformer and between the carbon monoxide removing portion and fuel cell).

Examiner respectfully disagrees. As set forth above, it is again noted that Reiser et al. is relied upon to render such a limitation obvious. Thus such arguments are not convincing, and the rejection of record is maintained.

Applicant argues that the dependent claims (18-19) are distinct from the prior art of record for the same reason as the independent claim (1).

Examiner respectfully disagrees. The rejection with respect to the independent claim has been maintained, and thus the rejections to the dependent claims are maintained as well.

Applicant argues that independent claim 20 is similar to independent claim 1 and is distinct from the prior art for the same reason.

Examiner respectfully disagrees. The applicable responses to the arguments to claim 1 (set forth in full above) are incorporated herein but not reiterated herein for brevity's sake.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **EUGENIA WANG** whose telephone number is (571)272-4942. The examiner can normally be reached on a flex schedule, generally 6 - 3:30 Mon. - Thurs., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. W./
Examiner, Art Unit 1795

/Gregg Cantelmo/
Primary Examiner, Art Unit 1795